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7. Category 1 Hazardous Materials

7.1 Introduction

LLNL has policies established to mitigate the risks from hazardous materials. This chapter provides LLNL's containment, communication, and control policies and their implementation requirements for onsite handling and transport of Category 1 Hazardous Materials. It identifies organizational responsibility and the hazards associated with Category 1 Hazardous Materials. **Section 8** provides those requirements for Category 2 Hazardous Materials, and **Section 9** for Category 3.

7.2 Accountability

Materials Management Section

MMS of the Applied Research Engineering Division is responsible for and authorized to control and account for Category 1 Hazardous Materials.

7.3 Identification of Category 1 Hazardous Materials

Types

Category 1 Hazardous Materials are both hazardous and "controlled" materials. The four types are:

- DOE's Accountable Nuclear Materials, Categories I, II, III, and IV
- Explosives
- Class II, III, and IV Sealed Sources and other radioactive materials
- DOE-controlled materials within a DOT Hazard Class, such as:
 - Other controlled materials that are defined as hazardous materials (for example, some forms of beryllium and its compounds, and carcinogens)
 - Nonhazardous controlled materials (for example, valuable materials, classified parts and material, special reactor materials, and Mock High Explosive [Mock HE]). **Note:** Certain types of mock HE may be hazardous material.

Table 7-1 lists hazard class numbers, division numbers, class or division

names, and those sections of the DOT regulations (49 CFR) which contain definitions for classifying hazardous materials, including forbidden materials.

Table 7-1. DOT Hazardous materials classes and index to hazard class definitions

Class	Division No. (if any)	Name of Class or Division	49 CFR reference for definitions
None	—	Forbidden materials	173.21
None	—	Forbidden explosives	173.54
1	1.1	Explosives (with a mass explosion hazard)	173.50
1	1.2	Explosives (with a projection hazard)	173.50
1	1.3	Explosives (with predominately a fire hazard)	173.50
1	1.4	Explosives (with no significant blast hazard)	173.50
1	1.5	Very insensitive explosives substances	173.50
1	1.6	Extremely insensitive explosive articles	173.50
2	2.1	Flammable gas	173.115
2	2.2	Non-flammable compressed gas	173.115
2	2.3	Poisonous gas	173.115
3	—	Flammable and combustible liquid	173.120
4	4.1	Flammable solid	173.124
4	4.2	Spontaneously combustible material	173.124
4	4.3	Dangerous when wet material	173.124
5	5.1	Oxidizer	173.127
5	5.2	Organic peroxide	173.128
6	6.1	Poisonous materials	173.132
6	6.2	Infectious substance (Etiologic agent)	173.134
7	—	Radioactive material	173.403
8	—	Corrosive material	173.136
9	—	Miscellaneous hazardous material	173.140
None	—	Other regulated material: ORM-D	173.144

Note: The hazard class of a hazardous material is indicated either by its class (or division) number, its class name, or by the letters “ORM-D.”

7.4 Receiving and Transfer Operations for Category 1 Hazardous Materials

Delivery Requirements of Category 1

When Category 1 Hazardous Materials are delivered to either the Main Site or Site 300, they must meet DOT regulatory requirements.

Onsite Delivery Points

Shipments of hazardous materials are ordinarily delivered directly to the MMS Vaults. On occasion, however, Category 1 Hazardous Materials that arrive through commercial channels (except explosives) may be delivered to the Main Site Receiving Group of the Business Services Department.

Receiving's Storage Responsibilities

When the Receiving Group takes delivery of Category 1 Hazardous Materials, the containers are to be stored as follows:

- Place small containers of controlled materials into a Receiving cage area
- Store large containers in a controlled area supervised by a lead Receiving employee.

All Category 1 Hazardous Materials are to be load listed by Purchase Order number or by other identifying means in LLNL's Procurement Accounting Receiving Information System (PARIS) upon arrival at LLNL.

Caution: MDD Receiving personnel are prohibited from repackaging damaged containers of Category 1 Hazardous Materials or removing container labels or markings.

Transferring Category 1 Materials to MMS

The Receiving Group must contact MMS to arrange the transfer of Category 1 Hazardous Materials (except explosives at Site 300) to MMS control points for distribution to the user.

Using Riggers to Transport Large Packages

For packages too large for transport in MMS vehicles, MMS contacts the Riggers Group in Plant Engineering for assistance. Riggers personnel transport containers in approved vehicles to MMS control points under MMS supervision.

**Transferring
Packages
between
Buildings**

LLNL personnel who want to transfer Category 1 Hazardous Materials between buildings onsite (except explosives at Site 300) must contact MMS prior to final packaging. MMS either packages the material, supplies the container, or advises the user concerning correct packaging methods. MMS transports the material in its vehicles or authorizes the package to be handcarried according to the MMS Handcarry Procedure, # MM-VI-10.

7.5 Receiving and Transport of Explosives

**Delivery of
Explosives at
Site 300**

All explosives are delivered directly to MMS at Site 300 from offsite.

**Handling
Explosives**

When handling explosives, MMS:

- Uses LLNL-approved tote boxes with Kimpack lining and dunnage to repackage explosives for transfer and storage.
Or stores and transfers explosives in their original shipping containers.
 - Returns empty, reusable shipping containers to the vendor.
 - Affixes proper LLNL Explosives Identification Labels to the containers.
-

**Transfers of
Explosives at
Site 300**

Site 300 personnel who handle explosives have been qualified to handle explosives in accordance with the *LLNL Health and Safety Manual*, Supplement 24.05. They may transfer explosives at Site 300 between buildings without the assistance of MMS.

However, transfers must be made in explosives qualified vehicles in accordance with the *LLNL Health and Safety Manual*, Supplement 24.03, and this manual (see the “Vehicle Requirements” section).

**LLNL Organi-
zations Approved
to Transfer
Explosives**

LLNL organizations approved for transferring explosives at Site 300 in approved vehicles and packages are:

- MDD
 - MMS
 - W-Division, Military Applications Directorate
-

- B-Division, Nuclear Design Directorate
- Materials Manufacturing Engineering Division (MMED), Engineering Directorate
- Chemistry and Materials Science Directorate
- HWM Division (waste only).

Refer to **Figure 4-1** in **Section 4** for the LLNL Organizational Chart.

**Handling
Explosive
Wastes**

Explosive wastes are not permitted at HWM Division facilities or on the HWM waste run. Explosive wastes generated at LLNL are packaged per DOT requirements and shipped to Site 300 for waste treatment and disposal. Explosive wastes generated at the Main Site may be shipped directly to an offsite commercial Treatment, Storage, Decontamination Facility (TSDF) for treatment and disposal. Explosive wastes generated at Site 300 are packaged in approved containers and transferred to an approved Waste Accumulation Area (WAA) for disposal at Site 300 or shipped offsite for disposal.

**Disposal of
Explosive Waste**

The approved disposal method for explosive waste is burning. No material other than explosives and explosives contaminated combustible waste and fuel to support combustion may be burned.

7.6 Containment, Communication, and Control Policies and Implementation Requirements for Explosives

This section provides containment, communications, and control policies and implementation requirements for explosives. Explosives are considered Category 1 Hazardous Materials.

**Hazards from
Explosives**

Explosives hazards include blast, fragments, and thermal effects.

**Containment
Policy for
Explosives**

At the Main Site explosives are packaged in DOT- or DOE-approved containers. DOT packaging requirements are followed.

At Site 300, explosives are packaged in DOT-, DOE-, or LLNL-approved containers.

**Containment
Requirements for
Explosives at
Site 300**

At Site 300, explosives are:

- Packaged in approved tote boxes, DOT- or DOE-approved, or other LLNL-approved containers and packages
- Cushioned with Kimpack liners, wrappings, and dunnage to preclude movement of the material inside the container.

The lids of large- and medium-sized tote boxes must be fastened down with cable-ties.

**Communication
Policy for
Explosives**

At the Main Site, explosives are packaged, labeled, and marked in conformance with DOT requirements. At Site 300, explosives are packaged and labeled to comply with the *Site 300 Safety and Operations Manual*.

**Communication
Requirements for
Explosives at
Main Site**

During transport of explosives at the Main Site, vehicles carrying explosives are placarded with the standard DOT placards, if required per DOT. The containers must:

- Use DOT marking and labeling requirements to communicate explosive hazards
 - Be identified with LLNL Explosive ID Labels
 - Be accompanied by a Controlled Material Identification (CMID) Tag
 - Be marked or labeled according to the appropriate hazard.
-

**Communication
Requirements for
Explosives at
Site 300**

At Site 300, vehicles transporting explosives are placarded with standard DOT placards, if required by DOT. The explosives containers must:

- Be identified with LLNL Explosives ID Labels
 - Accompanied by a Part Movement Tag.
-

**Controls Policy
for Explosives**

The use of trained and qualified personnel greatly reduces the probability of personnel error that could lead to an accident.

**Controls at the
Main Site for
Explosives**

The following administrative and/or physical controls are in effect at Main Site to mitigate the risk from explosives during transport:

- Only qualified explosives handlers are allowed to handle explosives.

- Explosives must be packaged by MMS, or be under the control of MMS or personnel qualified to handle explosives in accordance with the *LLNL Health and Safety Manual*, Supplement 24.05.
 - All vehicles used to transport explosives must be inspected using the Vehicle Inspection Form in **Figure 13-1**.
 - MMS supplies the container and verifies that the container is approved.
 - MMS transports explosives in approved vehicles in accordance with the *LLNL Health and Safety Manual*, Supplement 24.05.
 - Access to explosives are strictly controlled by procedures.
 - Hazards Control Explosives Safety maintains a current list of qualified explosives handlers.
 - Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
 - Drivers must not exceed the onsite speed limit of 40 km/h (25 mph).
 - DOT compatibility requirements are strictly followed. Fissile materials and explosives cannot be transported in the same vehicle.
 - Explosives cannot be transported during a lightning alert.
 - The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
-

**Control
Requirements at
Site 300 for
Explosives**

The following administrative and/or physical controls are in effect at Site 300 to mitigate the risk from explosives during transport:

- Only MMS and other explosives handlers who are qualified as per the *LLNL Health and Safety Manual*, Supplement 24.05, are permitted to package and transport explosives.
- Explosives can only be transported in approved vehicles in accordance with the *LLNL Health and Safety Manual*, Supplement 24.05.
- Access to explosives are strictly controlled by procedures.
- Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
- Drivers must not exceed an onsite speed limit of 40 km/h (25 mph) at Site 300.
- DOT compatibility requirements are strictly followed.
- Drivers are trained to understand and use DOT compatibility charts when loading vehicles.

- Fissile materials and explosives cannot be transported in the same vehicle. **Note:** Fissile materials are not allowed at Site 300 unless specifically authorized.
 - Explosives cannot be transported during a lightning alert.
 - The Site 300 Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
-

7.7 Containment, Communication, and Control Policies and Implementation Requirements for Accountable Nuclear Materials, Safeguards Categories I and II

This section provides containment, communication, and control policies and implementation requirements for Accountable Nuclear Materials, Safeguards Categories I and II. These Safeguards Categories are considered Category I Hazardous Materials.

Hazards from Safeguards Categories I and II

Some Accountable Nuclear Materials are radioactive and fissionable.

Accountable Nuclear Materials are given Safeguards classifications that range from large quantities of attractive material (Category I) to small quantities of low attractive materials ([other nuclear materials][Category IV]).

Containment Policy for Categories I and II

Radiological hazards are controlled through the use of proper shielding and containment to limit personnel exposures to ALARA levels.

Containment Requirements for Categories I and II

Accountable Nuclear Materials, Safeguards Categories I and II, are packaged in Nuclear Regulatory Commission- (NRC-) or DOE-approved Type B containers or other MMS-approved containers. DOT, NRC, and DOE-approved containers are criticality approved for specific quantities of fissile materials.

Packaging requirements for certified containers are delineated in the container Certificate of Compliance, and/or Safety Analysis Report on Packaging (SARP), or materials are packaged to provide adequate safety, limit radiation exposure, control contamination, and limit the movement of the material inside the package.

Devices transferred onsite may also undergo an in-depth criticality analysis as part of their initial design.

**Communication
Policy for
Categories I
and II**

Accountable Nuclear Materials are packaged to provide adequate safety and labeled or marked in a manner to properly communicate the identified hazard.

**Communication
Requirements for
Categories I and
II**

During onsite transport of containers of Accountable Nuclear Materials, Safeguards Categories I and II; the containers must be accompanied by a:

- CMID
- Transfer Form for Accountable Material.

The Certificate of Compliance, and/or SARP for each container may also describe criticality control measures.

**Controls Policy
for Categories I
and II**

The use of trained and qualified material handlers and MMS personnel greatly reduces the probability of personnel error that could lead to an accident.

**Control
Requirements for
Categories I and
II**

The following administrative and/or physical controls are in effect to mitigate the risk from Accountable Nuclear Materials, Safeguards Categories I and II, during transport:

- Accountable Nuclear Materials must be packaged by or be under the control of MMS.
- MMS either supplies the container or verifies that the container is appropriate.
- A Protective Force Division escort is required at all times during loading, unloading, and transfer operations.
- Fissile materials are not allowed at Site 300 unless specifically authorized.
- Two MMS personnel on the DOE Personnel Assurance Program are required to accompany the material at all times.
- MMS transports Accountable Nuclear Materials, Safeguards Categories I and II, in MMS-owned or MMS-approved vehicles.
- Access to Accountable Nuclear Materials, Safeguards Categories I and II, is strictly controlled by MMS material control procedures.

- No handcarrying is authorized.
 - DOT compatibility requirements are followed. Fissile materials and explosives cannot be transported in the same vehicle.
 - Packages shall not be lifted or transported higher than 4 ft above the ground unless specifically authorized.
 - Drivers must not exceed an onsite speed limit of 28 km/h (15 mph).
 - The Main Site Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
 - The Site 300 Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
-

7.8 Containment, Communication, and Control Policies and Implementation Requirements for Accountable Nuclear Materials, Safeguards Categories III and IV, and Other Non-sealed Source Radioactive Materials

This section provides the containment, communication, and control policies and implementation requirements for Accountable Nuclear Materials, Categories III and IV, and other non-sealed source radioactive materials.

Hazards from Safeguards Categories III and IV

Some Accountable Nuclear Materials are radioactive and fissionable.

Containment Policy for Categories III and IV

Radiological hazards are controlled through the use of proper shielding and containment to limit personnel exposures to levels that are ALARA.

Containment Requirements for Categories III and IV

Accountable Nuclear Materials, Safeguards Categories III and IV, and other non-sealed source radioactive materials are packaged in Nuclear Regulatory Commission- (NRC) or DOE-approved containers or other MMS-approved containers. DOT, NRC, and DOE-approved containers are criticality approved for specific quantities of fissile materials.

Packaging requirements for certified containers are delineated in the container Certificate of Compliance, and/or SARP; or materials are packaged to provide adequate safety, limit radiation exposure, control contamination, and limit the movement of the material inside the package.

Devices transferred onsite may also undergo an in-depth criticality analysis as part of their initial design.

**Communication
Policy for
Categories III
and IV**

Accountable Nuclear Materials are packaged to provide adequate safety and labeled or marked in a manner to properly communicate the identified hazard.

**Communication
Requirements for
Categories III
and IV**

During onsite transport of containers of Accountable Nuclear Materials, Categories III and IV, the containers must be accompanied by:

- CMID Tag
- Transfer Form.

The Certificate of Compliance, and/or SARP for each container may also describe criticality control measures.

**Controls Policy
for Categories III
and IV**

The use of trained and qualified material handlers and MMS personnel greatly reduces the probability of personnel error that could lead to an accident.

**Control
Requirements for
Categories III
and IV**

The following administrative and/or physical controls are in effect to mitigate the risk from Accountable Nuclear Materials, Safeguards Categories III and IV, and other non-sealed source radioactive materials during transport:

- Materials must be packaged by or be under the control of MMS.
- MMS either supplies the container or verifies that the container is appropriate.
- MMS transports Accountable Nuclear Materials, Categories III and IV, in MMS-owned or MMS-approved vehicles. Note: Handcarrying a package is allowed on a one-time basis for some Category IV materials (e.g., depleted uranium).
- Access to materials is strictly controlled by MMS material control procedures.
- Fissile materials and explosives cannot be transported in the same vehicle.
- Fissile materials are not allowed at Site 300 unless specifically authorized.

- No more than 399 g of plutonium are packaged within a single container.
 - Packages shall not be lifted or transported higher than 4 ft above the ground unless specially authorized by MMS.
 - Drivers must not exceed the onsite speed limit of 40 km/h (25 mph) at the Main Site and 56 km/h (35 mph) at Site 300.
 - The LLNL Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
 - The Site 300 Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
-

7.9 Containment, Communication, and Control Policies and Implementation Requirements for Sealed Sources

Hazards from Sealed Sources

Sealed Sources have hazards classifications that range from Class I (low hazard) to Class IV (high hazard). Q(A) values for each radionuclide are given in Table 2 of the *LLNL Health and Safety Manual*, Supplement 33.45, and the *MMS Sealed Source Procedure Manual*.

Containment Policy for Sealed Sources

Radiological hazards of sealed sources are controlled through the use of proper shielding and containment to limit exposures to levels that are ALARA.

Containment Requirements for Sealed Sources

Sealed sources from offsite are received at the MMS Vault in DOT packages.

DOT packaging requirements for sealed sources are followed.

Sealed sources are transferred between buildings in DOT or DOE-approved packages whenever possible, or they are transferred in containers approved and handled only by MMS personnel trained and qualified to handle and transport sealed sources.

Communication Requirements for Sealed Sources

During onsite transport of sealed sources, the containers must:

- Be accompanied by a CMID Tag
 - Have a yellow label and a plastic tag affixed (except for smoke detectors and exits signs).
-

Note: If the material is Class IV, the container must also have a metal tag attached indicating the source hazard class.

**Controls Policy
for Sealed
Sources**

The use of trained and qualified material handlers and MMS personnel greatly reduces the probability of personnel error that could lead to an accident.

**Control
Requirements
for Sealed
Sources**

The following administrative and/or physical controls are in effect to mitigate the risk from sealed sources during transport:

- Sealed sources must be packaged by or be under the control of MMS.
 - MMS either supplies the container or verifies that the container is a DOT or DOE-approved, or other approved container packaged to provide adequate containment.
 - Personnel who package and handle sealed sources during transfer operations are trained and qualified as per the *MMS Sealed Source Procedure Manual*.
 - Access to sealed sources are controlled by MMS control procedures.
 - Packages are swiped for non-fixed contamination prior to transport.
 - MMS transports sealed sources in MMS-owned or MMS-approved vehicles.
 - Handcarrying is allowed for sealed sources only with specific approval from MMS.
 - Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
 - DOT compatibility requirements are strictly followed. Materials Management Technicians are trained to understand and use DOT compatibility charts when loading vehicles.
 - Drivers must not exceed the onsite speed limits of 40 km/h (25 mph) at the Main Site and 56 km/h (35 mph) at Site 300.
 - Sealed sources are surveyed for radiation contamination semiannually.
 - The Main Site Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
 - The Site 300 Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
-

7.10 Containment, Communication, and Control Policies and Implementation Requirements for Other Category 1 Hazardous Materials

Hazards from Other Category 1 Hazardous Materials

Some Category 1 Hazardous Materials as identified in **Section 7.3** may require controls to ensure protection of LLNL personnel, the public, and the environment.

Containment Policy for Other Category 1 Materials

Controlled materials received from offsite are delivered in DOT packages by MMS.

Other Category 1 Hazardous Materials are packaged to provide adequate safety, limit exposure to hazardous materials, control contamination, and limit the movement of the material inside the package.

Containment Requirements for Other Category 1 Materials

These materials, when transferred between buildings, are transported in DOT or DOE-approved packages whenever possible, or the controlled materials are transferred in approved containers and handled by personnel under the supervision of MMS.

Communication Policy for Other Category 1 Materials

Hazardous and controlled materials are packaged, labeled, and marked in conformance with DOT requirements.

Communication Requirements for Other Category 1 Materials

During onsite transport of other Category 1 Hazardous Materials the containers must:

- Be accompanied by a CMID Tag
 - Be marked or labeled to identify the appropriate hazard.
-

Controls Policy for Other Category 1 Materials

The use of trained and qualified material handlers and MMS personnel greatly reduces the risks associated with other Category 1 Hazardous Materials.

**Control
Requirements for
Other Category 1
Materials**

The following administrative and/or physical controls are in effect to mitigate the risk from other Category 1 Hazards Materials during onsite transport:

- Category 1 Hazardous Materials must be packaged by or under the control of MMS.
 - MMS either supplies the container or verifies that the container is a DOT-approved or DOE-approved, or is a container packaged to provide adequate containment.
 - Personnel packaging and handling Category 1 Hazardous Materials must comply with the *LLNL Health and Safety Manual* requirements for hazardous materials.
 - If an operation is not covered under the existing MMS procedures, an OSP or an FSP must be prepared to address hazards, basic controls, and safety ground rules to be followed.
 - Access to Category 1 Hazardous Materials are strictly controlled by MMS control procedures.
 - MMS transports Category 1 Hazardous Materials in MMS-owned or MMS-approved vehicles.
 - Handcarry authority may be authorized only in accordance with the *MMS Material Control and Accountability Manual*.
 - Packages shall not be lifted or transported higher than 4 ft above the ground, unless authorized.
 - DOT compatibility requirements are strictly followed. Drivers who are DOT HazMat employees are trained to understand and use DOT compatibility charts when loading vehicles.
 - Drivers must not exceed the onsite speed limits of 40 km/h (25 mph) at the Main Site and 56 km/h (35 mph) at Site 300.
 - The Main Site Fire Department must be able to respond to any emergency at the Main Site within 3 minutes.
 - The Site 300 Fire Department must be able to respond to any emergency at Site 300 within 15 minutes.
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